LA-UR-96-826

Title: **Los Alamos National Laboratory Science Education Program Progress Report October 1, 1995 - December 31, 1995**

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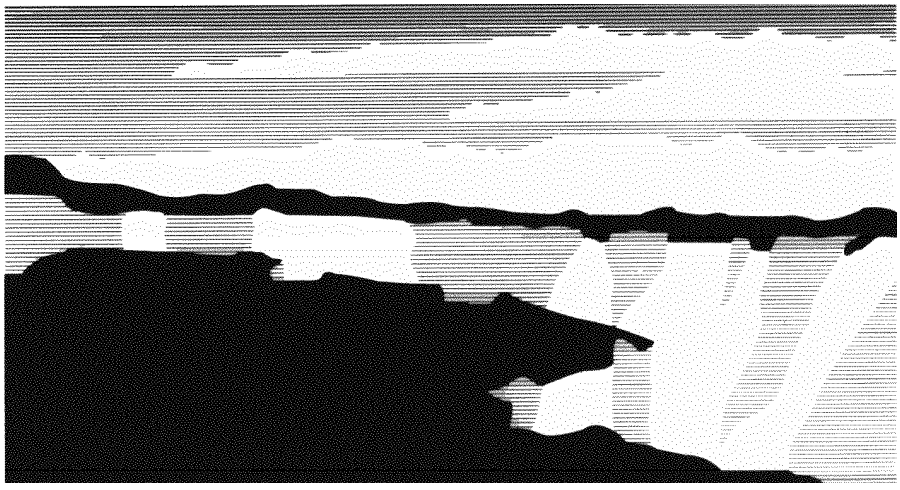
Submitted to:



Los Alamos
NATIONAL LABORATORY

Form No. 836 R5
ST 2629 10/91

LOS ALAMOS NATIONAL LABORATORY

SCIENCE EDUCATION PROGRAMS

PROGRESS REPORT

October 1, 1995 – December 31, 1995

Los Alamos National Laboratory

Mail Stop F671

Los Alamos, New Mexico 87545

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LOS ALAMOS NATIONAL LABORATORY

SCIENCE EDUCATION PROGRAMS

PROGRESS REPORT

October 1, 1995 – December 31, 1995

TEACHER/FACULTY ENHANCEMENT

National Teacher Enhancement Program (NTEP)

The first workshop of the third year was held November 13-14, 1995. The emphasis for the third year is leadership. A scenario was developed to bring the teachers from the first two years together and to demonstrate how to incorporate leadership into the program. The plan is to build toward the development of a transfer component consisting of a curriculum piece, an action plan, and a leadership product (these may be all one product). Teachers were asked to develop and conduct a survey of their school's science program and to determine areas of strengths and areas for growth. The next workshop will review the results of the surveys to determine areas for self-immersion. Leadership for change will also be emphasized.

Nonproliferation & International Security – Teacher Enhancement Program (NIS – TEP)

During this quarter, there has been no activity. The NIS-Teacher Enhancement Program concluded on August 4, 1995. Recruitment for teacher participants and Laboratory mentors will begin in January, 1996. The HR-SEO office will send out NIS-TEP applications to high schools across New Mexico. In addition, a call for research proposals for the summer NIS-TEP participants will go out in January. The summer program for 1996 will be held from June 17 - August 9, 1996. We will again host five New Mexico teachers at Los Alamos. We also plan to continue the development of curriculum materials that focus on air pollution and monitoring techniques for students.

Teacher Environmental Assessment and Monitoring Program (TEAM) (Formerly FCCSET High School Teacher Summer Institute)

The 1995-96 cadre's first follow-up workshop was held in Los Alamos, November 6-7, 1995. Below are some of the highlights of the workshop.

- Sharing of program implementation information by each of the teams in the program.

- A session by Pat Longmire and Andy Adams of the CST-7 group on groundwater characteristics and sampling. Pat and Andy delivered an hour-long presentation during which they discussed some of the basics of groundwater chemistry and

the geology of the region. They then took us into the field where we visited a ground-water testing well and then met with two field specialists from the New Mexico Environment Department (NMED). After a not-so-easy trek through the bush, we ended up at "Basalt Springs" where Andy and the folks from the NMED sampled for various parameters. (At the program's second follow-up workshop the TEAM participants will analyze the data collected). Pat and Andy returned the next day to go over Pat's ever-popular problem set.

- A session on "What's New With GEONet" by Carolyn Briles. Carolyn reviewed how to access GEONet and then went on to cover 'uploading' and 'downloading' files into the TEAM program conference. In addition, she covered how to access other computers (at universities, at the U. S. Department of Education, etc.) using 'Telnet,' a new GEONet capability. In addition, she covered how to use GEONet's Internet e-mail capabilities.

Andy Adams of CST-7 agreed to provide assistance to the TEAM program on a regular basis (25% of his time). His assistance will be invaluable in continuing to plan valuable field experiences and problem sets for TEAM participants, make visits to TEAM schools, communicate with participants on GEONet, and assist with planning for the 1996-97 TEAM program.

Three applications for 1996-97 cadre "Master Teachers" were received by the December 15 deadline. All three applications were from individuals well qualified to assume the Master Teacher role for the upcoming cadre. All three were notified of their acceptance and will begin to meet with the program coordinator, Andy Adams (CST-7), Pat Longmire (CST-7), and other Laboratory scientists to plan the 1996 TEAM program summer institute.

Teacher Research Associates (TRAC)

For FY96, the DOE will fund 10 regional teachers to conduct research for the summer of 1996 TRAC program. There will not be a national TRAC program for FY96. We are currently mailing the applications for New Mexico and southern Colorado and will select the research projects during the next quarter. The teacher application deadline is March 4, 1996. We have received 10 research proposals from Laboratory staff, to date.

We continue to keep in touch with many of the past TRAC teachers electronically. As schools set up their phone lines and access to Internet, teachers have been contacting us with their e-mail addresses. As information about workshops, Internet sites, and other educational information comes our way, we forward it to the teachers.

Teacher Opportunities to Promote Science (TOPS)

During the first quarter of FY96 Los Alamos accomplished the following in the TOPS program:

A second round of site visits was conducted for the third TOPS cohort. The coordinator observed science, math, or technology classes for demonstrated classroom applications of methodology, strategies, content, technology, etc.

introduced to the teachers during the TOPS workshops and summer institute. Visits included school administrators, teams, and teacher peers.

Regional meetings were held around the state for TOPS teachers, mentors, and alumni. The meetings were designed to provide technological support for the storm tracking project; increase teacher involvement on GEONet; and provide an opportunity to share and solicit feedback about the implementation of the instructional units designed during the summer institute experiences.

A follow-up workshop was conducted on Interlearn at LANL on December 4-5,1995 for SNL and LANL TOPS teachers. Interlearn is based on the theory of multiple intelligence, using the philosophy of education which combines a variety of theories and techniques not usually found within the scope of traditional educational methods, known as integrative learning. The workshop provided an opportunity for teachers to use Interlearn staff as a sounding and review board for their initial attempts at implementing changes in their classrooms. Teachers brainstormed ideas for assessing the impact of these changes and agreed to collect supportive data throughout the remainder of the school year.

Assessing The Impact Of The Tops Program On Participants' Students

We collected attitude and achievement information from the TOPS participants' students within the first four weeks of school in the fall as part of our Year 2 project. We have spent the first quarter of this project year engaged in the following activities:

- Working on the contract negotiation between LANL and UNM;
- Completing all required forms once the contract was awarded;
- Providing feedback on class performance to last year's teacher participants;
- Beginning to score the select-and-fill-in concept map achievement response sheets;
- Beginning to scan all pre-test data into computerized form.

TOPS Mentor/Weather Tracking Project

The first round of site visits for TOPS mentors was conducted. The TOPS coordinator and science coordinator made site visits to the schools of the TOPS mentors in the northern part of the state in conjunction with site visits to the third cohort of TOPS teachers. The purpose of the visits was to survey hardware needs for the storm tracking project and check the mentors out on using GEONet to ensure that they'll in turn be able to get all the new teachers in their regions up and running.

Regional meetings were held around the state for TOPS teachers, mentors, and alumni. The mentors planned the agenda and coordinated their regional meeting. All of the northern regions had already met at least once and two of the four regions reported 100% participation on GEONet by their teachers. The meetings were designed to provide technological support for the storm tracking

project; increase teacher involvement on GEONet; and provide an opportunity to share and solicit feedback about the implementation of the instructional units designed during the summer institute experiences.

A two-day TOPS Mentor workshop was conducted in Los Alamos on December 4-5, 1995. The workshop was held in conjunction with the regular TOPS workshop so that regional meetings for TOPS teachers and their mentors could be held on the evening of December 4, 1995. Professor John McGraw of UNM introduced the mentors to the Lodestar project (a project sponsored by the Institute for Astrophysics at the University of New Mexico that is studying cloud formation and its impact on astronomical observation) and outlined his ideas for a partnership between the Lodestar project and the TOPS storm tracking project. The mentors were given Macintosh computers through the DOE Equipment Gift program. These computers will be used with the weather stations they received as TOPS teachers to implement the storm tracking project and model the use of the technology for the TOPS teachers.

Science Outreach Program

Science Outreach teachers are developing their leadership skills and working within their districts, as well as with a partner district, through a new regional initiative. The Regional Educational Technology Assistance (RETA) initiative is funded by the State Department of Education through the Science Education Program at Los Alamos National Laboratory (LANL). Using the Science Outreach Program, a teacher enhancement program designed to support state-wide educational reform, the RETA cadre benefits from a current educational technology framework that has developed to provide the technical assistance and training now proposed for Technology Leaders. This alliance not only strengthens the resource base available but will also facilitate administrative requirements.

The Science Outreach core and RETA participants attended a workshop in December, 1995, which focused on integration of technology into the classroom. Julie Meyne, genetics scientist at LANL, presented a genetics lecture from Internet resources modeling ways to integrate the Internet and other technologies into the classroom to enhance instruction. The next RETA workshop will be in Las Cruces, New Mexico, at New Mexico State University, on Friday, April 12, 1996, and will focus on assessment strategies of technology in education.

The RETA cadre is currently working on organizing one-day regional events, called RETA Fiestas, that will bring local teachers together on a Saturday to learn about educational technology resources and applications and forge new partnerships among teachers and with institutions of higher education.

The RETA Fiestas will be in March and April throughout the state. The dates and times have been set and are as follows:

Gallup (University of New Mexico Branch)	March 2, 1996
Portales (Eastern New Mexico University	March 9, 1996
Santa Fe (Santa Fe Community College)	March 16, 1996
Cimarron (Cimarron Middle school)	March 23, 1996
Farmington (San Juan Community College)	March 30, 1996
Las Cruces (New Mexico State University)	April 13, 1996

CURRICULUM IMPROVEMENT

Radiation/Risk Assessment Curriculum Development

The Radiation Risk Assessment curriculum project involves developing a curriculum for use in a high school physics or physical science class. Being developed in partnership with the Santa Fe Public Schools and EnterLearn Technologies of Norfolk, VA, the curriculum follows a theme of Risks, Rewards, and Responsibilities. Specifically, students explore the various aspects of radiation in the context of making responsible societal decisions.

The underlying premise is that one takes risks to attain rewards. But in the process, there are both individual and societal responsibilities to be considered. Further, emphasis is placed on what is known as fact as opposed to what may be believed as supposition. Then the issues of radiation are explored with respect to the scientific basis, risks to self and society, and the need for understanding to make learned decisions.

During this quarter, the primary work involved integrating the approaches of the two Santa Fe teachers collaborating on the project, outlining the lessons, and developing a format presentation of the curriculum (as opposed to the classes themselves). The next draft for review, formatted in a teacher-friendly form, is expected shortly after the start of the calendar year. Additionally, a preliminary videotape of student responses during testing of the curriculum last quarter was prepared. Finally, because of the close alignment of this project with NEWNet, an educational component of the NEWNet proposal for FY96 internal funding was developed.

During the next quarter, completion of the above mentioned draft and its review is anticipated. Further, presentation of progress to Santa Fe schools personnel, including the Superintendent, will occur. Finally, with the draft, the assimilation of supporting materials to complete a teacher resource kit will commence.

AIMS Curriculum Development

Los Alamos scientists are working with the AIMS Education Foundation to produce curricular modules and activities in areas of physics that are unique to Los Alamos' areas of expertise. During this quarter an activity was completed on fluid instabilities for grades 5-9. This material, entitled "Look Out Below", was published in the AIMS Journal of November, 1995. This module will eventually be part of a textbook of 25 such modules. Additional modules are being developed, drawing on the unique expertise of Los Alamos scientists.

STUDENT SUPPORT

Pre-Service Institute for Science and Math (PRISM)

The main focus for the program for this quarter involved student support activities and planning student-directed research courses at UNM-LA and NNMCC. The coordinator met informally with small clusters of students throughout the semester to address the following issues: arrange tutors, check on academic progress, discuss time-management strategies, recommend study-skill tactics, promote and coordinate scholarship and employment applications, and assist with course schedules for the spring semester. The coordinator, a science faculty member at Northern, and a Laboratory scientist attended the Project Kaleidoscope Workshop: The Research-Rich Environment to envision and plan student-directed courses for beginning college science and technology students. Courses were designed and implemented at the two campuses to include both PRISM participants and other interested students. Jim Amann of P-25 is teaching the two-credit course at UNM-LA in undergraduate research. Arlene Antilla at Northern New Mexico Community College has redesigned her Introductory Biology course to include an emphasis on student-directed research projects. PRISM is supporting these initiatives to help beginning students experience the process of science early in their college program.

Summer Experience for the Economically Disadvantaged (SEED)

Project SEED, a student program for eligible high school juniors and seniors, is slated to run in the summer of 1996. Application materials were sent to all area high schools, and site visits are being planned to encourage more involvement by students in Northern New Mexico. In addition, program materials were made available to all Native American student programs through contacts provided by area schools and site visits made by the Laboratory coordinator for Native American education programs.

Summer of Applied Geophysical Experience (SAGE)

Activities in this past quarter were devoted mainly to preparation and planning for SAGE 1996. The co-directors of SAGE attended the annual meeting of the Society of Exploration Geophysicists (SEG) in Houston to present a poster discussion at the Student/Academic reception and an oral report to the Student Education Committee. The SEG is strongly supportive of SAGE, and has been instrumental in helping to forge links with companies such as Arco, Exxon, and Mobil. The Student/Academic reception presents an opportunity for SAGE personnel to contact students and their faculty members directly, and is an important recruiting opportunity. In addition, we are able to talk to sponsors from industry. Representatives from several industrial corporations attend the Student Education Committee, thus it has been important for SAGE to listen to their concerns and advice. A broad concern voiced this past year is that of gaining more minority participation in the geophysical industries. The committee recognizes that SAGE can help in attracting minority students to the field of geophysics. Representatives from Arco reiterated their strong desire to ensure that SAGE is open to students from all colleges and universities across the country. Because of our extensive recruiting efforts, students attending SAGE do come from a broad spectrum of institutions, with no more than two from any

single institution. Last year (1995), students attending SAGE represented 20 U. S. colleges and universities, 4 foreign universities, the U. S. Bureau of Mines, and a U. S. high school.

In October, the SAGE faculty met for a twice-annual planning workshop. Among the agenda items were the task of assigning grades to students who attended SAGE 1995 for academic credit, planning for the January student seismic-processing workshop (sponsored by the National Science Foundation Research Experiences for Undergraduates program), presentation of data acquired during SAGE 1995, and preliminary plans for SAGE 1996.

Finally, a research paper presenting results acquired during several years of SAGE was published by the New Mexico Geological Society at its annual field conference. Information in the publication has already attracted the attention of geologists evaluating the hydrocarbon potential of the Española basin.

Critical Issues Forum

This is a new program that combines successful components of two previous programs, High School Forum on Critical Issues and Students Examining Issues in Science and Society.

During the first quarter of FY96, the organization and planning began for the Critical Issues Forum, which includes an academic year component (spring semester) and a two-week summer institute for the participating teams. Twenty computers were collected from LANL surplus to be gifted to the participating schools. Each has a minimum of 4 Mb RAM and 60 Mb hard drives. This was done so that participating teams in the Critical Issues Forum could access the GEONet and fulfill program requirements.

Two workshops were held for electronic mentors, who will participate by critiquing student work, uploading pertinent information to the GEONet Bulletin Board, and answering questions via GEONet e-mail. These workshops were held on December 17, 1995 and January 4, 1996. To date, 20 scientists at LANL have participated in introductory workshops and are available as electronic mentors and include the following divisions; CST, NMT, XPA, ESA-WE, DD COM INV, ESH, PD-NMSM, CISA, and MLNSC.

An introductory packet, including teacher and administrator applications, were sent to all high schools (public and private) throughout the state of New Mexico. Interested teachers were required to submit applications along with a sponsoring administrator. The applications were screened by LANL staff and the top 20 teachers were invited to participate in the Critical Issues Forum. Planning began for an introductory workshop for teachers (January 18-19), and the agenda and all arrangements were finalized.

New Mexico Supercomputing Challenge

October was a very busy month for the New Mexico High School Supercomputing Challenge. Over 900 students and teachers signed up in September to participate in the 1995-96 Challenge and about 800 of them attended the Kickoff Conference at Glorieta Baptist Conference Center in late October. Almost 40 individuals from

Los Alamos National Laboratory participated in the 4-day Kickoff Conference by teaching classes, helping in computer labs, talking to students during the "Meet the Scientist" evenings, facilitating the event, distributing computer accounts, and helping with setup and dismantling of the computer labs.

In November, the State Challenge Committee Coordinator assigned LANL eight high schools to visit. In November and December, three LANL employees visited those schools to encourage the Challenge teams, make sure they had computer access from their schools as they did at Glorieta, and see if they were encountering any problems. Those schools were Los Alamos High, Pojoaque High, Española Valley High, Santa Fe High, Santa Fe Indian School, Santa Fe Prep, Pecos High, and Moriarty High.

LANL and the Challenge were present for Discovery Days at New Mexico Highlands University where they brought in high school students from around the state to show them NMHU in Las Vegas, NM.

In December, the Challenge was represented at Super Computing '95 as part of the Los Alamos National Laboratory booth. A poster was displayed as part of the teacher education sessions as well.

As a follow-up to last summer's popular eleven-day Summer Teacher Training Session, preparations are underway for next summer. We hope to have two sessions, one at Eastern New Mexico University in Portales and the other at New Mexico State University in Las Cruces. At the Kickoff Conference, about 80 teachers indicated interest in attending sessions in the summer of 1996.

Preparations were made for the Regional Workshops to be held in January at six different institutes of higher education around New Mexico. Students from each region come in for a one-day workshop in programming, Unix, the Internet, and public speaking.

Historically Black Colleges and Universities (HBCU)

Major activities for the Historical Black Colleges and Universities (HBCU) Program in this quarter were:

- New Mexico Highlands University Engineering Advisory Committee Meeting, Las Vegas, NM, October 6, 1995;

- American Indian Science & Engineering Society (AISES) National Conference, Detroit, Michigan, Recruitment. November 10-11, 1995; and

- Washington, DC., meeting with Fred Faine, seeking funds to support HBCU Program organized by Norfolk State university and hosted by Los Alamos National Laboratory, December 4-5, 1995.

There are currently 10 graduate HBCU students doing research internships at the Laboratory, and additional students will be coming for the summer.

Mentored Collorabortive Research With Resident University Teams

We have proposed a pilot program that would be of technical excellence, closely coupled to our Laboratories core defense missions, emphasize diversity, New Mexico and regional universities and colleges. In this program, student and faculty teams would work along side Laboratory researchers on "target" project areas that have relevance to our Laboratories technical challenges of the future.

Under the direction of a senior staff member, teams would consist of students who are pursuing post-secondary education at several levels: associate, bachelor's and graduate degrees. A student team consisting of different educational levels would provide motivation and mentoring within itself. The duration of the team's project would be at least one semester. Programs of this length (or longer) are highly recommended by both educators and mentors to provide a meaningful experience.

Because the teams are "project" oriented, they can include students from different disciplines, for example, computer science, engineering, and material science. This will provide the additional experience of working together in a multidisciplinary manner, much like the common work experience at the Laboratory.

Areas targeted for projects include, where possible, experiments and computer analysis. Some of the targeted project technical areas are:

- dynamic behavior of materials (including fracture);
- energetic materials;
- aging and corrosion of materials;
- fabrication: machining, forming, casting, joining (welding); and
- intelligent controls.

Where possible the teams will be comprised from local and regional colleges and universities. We will also recruit highly qualified candidates from other universities.

Progress

A selection has been made for a single project for FY96 . A senior staff member has been identified and student recruitment has begun. The project will be conducted during the summer at Los Alamos.

Project Title: Microstructures and Properties of Erbium Oxide (Er_2O_3)
Project Mentor: Dr. John J. Petrovic, MST-4, Laboratory Fellow

Project Description

Erbium oxide (erbia, Er_2O_3) is an important ceramic material related to stockpile stewardship. However, the microstructures and properties of both polycrystalline and single crystal erbia have not been extensively investigated. We propose to fabricate both polycrystalline and single crystal erbia, and study the microstructures, mechanical properties, and thermal properties of this material. The proposed project will be conducted in association with the Single Crystal Growth Laboratory (SCGL) at the Materials Science Laboratory (MSL). Other MSL facilities will also be employed as necessary. This project would be conducted by appropriate students during summer 1996, under the supervision of LANL personnel.

The students will work during summer 1996 under the supervision of Dr. John J. Petrovic and other LANL personnel associated with the MSL and the SCGL. The student activities will include aspects such as a comprehensive literature survey on erbia; the fabrication of dense polycrystalline erbia materials from erbia powders; the synthesis of erbia single crystals from polycrystalline erbia feed materials; the microstructural characterization of erbia materials by techniques such as optical microscopy, scanning electron microscopy, x-ray diffraction, and transmission electron microscopy; and the mechanical property characterization of erbia materials using microhardness indentation methods as a function of temperature.

We are currently in the process of establishing the student team. At this time, Dr. Petrovic has identified three interested and promising students: a Los Alamos High School student, Russell Romero, who is graduating in May; a New Mexico Tech Senior, Robert Rodriguez, who will be graduating in fall of 1996; and a sophmore from MIT, Marlene Platero, who is from the Taos Pueblo. We are still recruiting at UNM and at the Colorado School of Mines. John's student team may also include a faculty from one of these institutions and possibly a total of three to five students.

National Science Bowl

The 1996 New Mexico Regional Science Bowl will be held at the Hyatt Regency Albuquerque on Saturday, February 24, with an awards banquet to follow. Los Alamos National Laboratory (LANL) and Sandia National Laboratories (SNL) sponsor separate regional competitions, but hold them on the same day. The planning is done cooperatively by LANL and SNL, and the two Laboratories hold a joint awards ceremony and banquet.

An initial invitation packet went out to all high schools in New Mexico, with teachers asked to register their team members by December 15, 1995. Thirty-four teams responded to the invitation, and will have an opportunity to compete in either the regional run by SNL or LANL.

A call for questions went out to scientists at LANL and respondents sent their material to Bill Robertson by December 21, 1995. The questions and answers

were then forwarded to the Oak Ridge Facility, where they will be assembled into tournament questions for each of the rounds of competition.

LANL began designing artwork for the event to be included on T-shirts, program flyers, and the event program. Orders were placed for T-shirts and hotel facilities, including the banquet.

Volunteers were contacted and training times were scheduled to prepare the officials for the competition. A total of four practice sessions will be held prior to the event.

Underrepresented Minority/Female Initiative

Currently, there are 7 GRA students on board. Six of the seven are on a 50/50 salary cost share basis with their host technical organization and the URM/F program.

Plans are underway with UNM-LA to develop this summer's (1996) eight-week summer institute. About 20 students are expected to participate.

Other Activities

- Supported LANL Native Americans in several recruiting and conference initiatives. They have submitted names and employment applications for possible summer internships placements.

- Participated in two National Hispanic conference/career fairs.

- Have given several science education outreach presentations to professional and church groups

- Remain active on the Council for Technology as it pertains to distance learning education in New Mexico Schools.

In FY95, the Under-represented Minority/Female program distribution was 67% Hispanic, 20% Anglo (female), 9% Native American and 4% African American, of which 77% were from New Mexico.

Atomic, Molecular, and Optical Physics Summer School (AMO)

This quarter marks our initial recruiting phase for the summer session of 1996. As in previous years, color posters have been produced and sent to Departments of Physics and Societies of Physics Students (SPS) at most universities and colleges within the United States. This mailing covers hundreds of institutions. In addition, a single-page flier was also produced and distributed to members of the Division of Atomic, Molecular, and Optical Physics of the American Physical Society, reaching thousands of interested scientists. A new feature this year is a World Wide Web homepage on the UNM system. The page includes general information on the summer school, the Laboratory, and Los Alamos as well as detailed application material. Applications can now be made directly from the Web Page or through e-mail, in addition to the usual snail mail route. The primary responsibility for this stage rests with the Center for Graduate Studies at the University of New Mexico in Santa Fe that has trained staff in such matters.

The deadline for submitting applications is February 1, 1996. Applications this year are running well ahead of any previous session with the prospects of attracting an outstanding class of students.

At the same time, planning for the 1996 session has begun with housing requests, invitations to guest lecturers, and mentoring recruitment. Many of the past undergraduate students have requested letters of recommendation to graduate schools from lecturers and mentors in the program. We have witnessed an interesting and very encouraging new trend in the request by postdoctoral fellows both at the Laboratory and as far away as Harvard, to teach at the school. Last year, Dr. Daniel James, a fellow in Group T-4, did an outstanding job of both mentoring research projects and presenting lectures. His involvement was entirely voluntary in order to gain experience with students. This reflects well upon the reputation of the school as well as indicating yet another need the organization fulfills of providing a teaching experience for bright, young scientists that might wish to pursue academic careers. We continue to attract a diverse group of senior scientists that provide a series of lectures on "hot" topics in the field.

We have begun our second year under a National Science Foundation Research Experience for Undergraduates (REU) three-year site grant at the level of $150,000 or $50,000 per year.

Science Engineering Research Semester (SERS)

The Fall, 1995 SERS group consisted of 27 students. Two of the students were funded by research groups. All site visits were completed in October. There were many supplementary education activities planned for the students during this quarter. They included the following tours: a geology field trip to the Jemez Mountains and tour of the MILAGRO Project, the Liquid Scintillating Neutrino Detector, the Mixed Waste Disposal Area, the Health Physics facility and labs, and a very exciting visit to observe an explosives detonation. We also had a special seminar on giving a good technical presentation. As a result, all of the students gave good technical talks that were well attended by managers and researchers who commented favorably on the quality of the student presentations. In addition, a potluck luncheon for the students and mentors was well attended and followed up with a presentation on Nuclear Stockpile Issues. We concluded the semester with the SERS poster session on December 7, 1995.

The poster session was held at the Bradbury Science Museum, a wonderfully conducive atmosphere for presenting the results of the student research. Approximately 150 people were in attendance. Rebecca Phillips, Deputy Director for Human Resources Division, presented the students with their Certificates of Achievement. The mentor appreciation dinner was held at Rancho de Chimayo, with a great turnout. Approximately eight students have returned for an extended stay during the spring semester (graduated seniors), either with the same mentor or a new group and mentor. The Spring 1996 SERS students were selected during December, and 24 new students will arrive January 16, 1996.

We received approximately 55 proposals from Laboratory staff members for 25 funded positions. The SERS program continues to be a popular and successful

program. The caliber of students has been quite good. The LANL scientists recognize the usefulness and importance of this educational program. After a brief review of the mentor evaluations, many responded that a little "seed" money would be useful to assist with minor expenses related to the SERS students research project. We received 70 student applications for review for the spring 1996 semester. This number represents a decline from previous semesters. The coordinator has been working on a revision of the SERS goals and objectives which is still ongoing.

Science and Technology Alliance

There are currently three Alliance students at the Laboratory serving research internships. Additional students will be coming this summer. Other activities this quarter included:

- New Mexico Highlands University, Science and Technology Alliance (S&TA) recruitment, October 13, 1995.

- Science and Technology Alliance Steering Committee Meeting, Washington, DC, December 13-15, 1995.

Regional Two-Year College Initiative

To date there is one research project in place and another contract being formalized with the Northern New Mexico Rural Educators Network that will pilot a six-month "on-line classes for credit" program, using the University On-line system.

A contract is in place with the United World College to develop an educational program derived from the adaptation of geothermal energy on their campus. Two faculty members and several students are involved.

The coordinator has been working with Luna Vocational Institute to get several SUN System workstations in place, so that they can incorporat these systems into their advanced manufacturing technology program.

Three students have been working as part-time UGS students. One graduate student will be an offsite student, teaching courses at the School of Education at New Mexico Highlands University. He will be teaching four technology education classes and providing technical assistance to the regional two-year postsecondary institutions.

Preliminary collaborations with New Mexico State University and twelve (12) two-year postsecondary institutions have begun in a joint effort to develop a New Mexico advanced manufacturing technology consortium.

A Northern New Mexico Consortium for Advanced Technologies NSF/ATE pre-proposal is being drafted to meet the February 1, 1996 deadline.

Demographics

Evaluations Reports and Demographics - In FY 95 the Two-year College Initiative had 55% Anglo, 31% Hispanic, 11% Native American, and 3% African American distribution, of which 84% were from New Mexico.

FSCRP (Faculty Student Collaborative Research Program)

We have begun the planning and design phase of this new university research program. Contact was made with several Laboratory scientists and university faculty to gather preliminary information to assist in the planning of the program. A FY96 budget was prepared.

EDUCATIONAL TECHNOLOGY

Teaching Hearing-Impaired Students to Speak

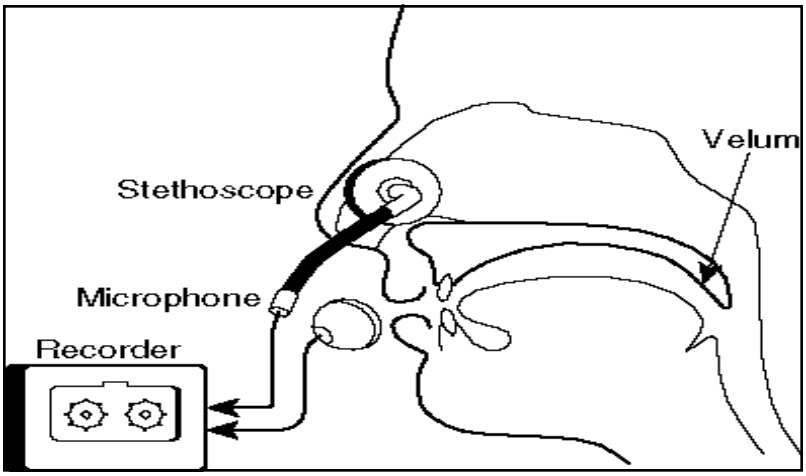
Improved Nasalometer

One of the most difficult problems for hearing-impaired students is control of the velum, the soft palate that acts as a valve between the oral tract and the nasal tract. It is not readily visible, and does not seem to be prominent kinaesthetically. Nonetheless, it is of great importance because failure to close the velum results in inappropriately nasalized (and unclear sounding) speech sounds. In prior work, we have made a first cut at a nasalometer, but the results were not as stable as we wanted them to be and they were displayed in an arbitrary manner rather than in a kinaesthetically meaningful manner as our other results are displayed.

Our first problem was to measure the movements of the velum. From prior efforts, we have a small repository of data from x-ray microbeam measurements, but the amount of data are insufficient to achieve stable results. Therefore a new method was required. We inquired of a number of prominent phoneticians and were told that the problem of picking up nasalization was very difficult. Undeterred, we experimented with various approaches and developed a method that is an extension of stethoscope technology. In our approach, a stethoscope is placed on the side of the nose and a condenser microphone is inserted in the stethoscope tube to pick up the sounds of nasalization. After some computer signal processing enhancement, the signal picked up through the stethoscope appears to be a satisfactory surrogate for actual measurements of the velum itself. The apparatus is shown in the accompanying illustration. The stethoscope system seems to work well enough that it might be a useful tool in its own right. However, it is not in line with our overall concept of the project, which involves displaying inferred movements on the screen. Consequently, we have implemented a computational neural network to learn the relationships between nasalized sounds and movements of the velum. Katherine Dueringer, a SERS student, has gathered data from an additional 28 speakers, which we believe is a sufficient number to yield much more stable results than we had previously. Derek Carson, a previous SERS student, now a Graduate Research Associate, is programming the display for real-time operation.

Application

Katherine Dueringer has developed a questionnaire and experimental design for testing our system on hearing-impaired subjects. We have pilot tested the system on a SERS student who has substantial (80%) hearing loss. We are arranging to take the system to the Santa Fe School for the Deaf for further field trials.



Apparatus for transducing nasalization. A stethoscope is placed against the side of the nose. The nasal signal is transduced by a microphone inserted into the stethoscope tube. The speech signal is picked up and recorded simultaneously by a microphone at the mouth.

Education Networking Support (EduNets)
(Formerly Technology Planning Support for Schools and Internetworking Models for Education)

Networking Technology Planning, Consulting, and Implementation Support for Education
Providing Training, Software Tools, and Interfaces for NM Educators to Successfully Use Networking, Internetworking and Intranetworking Resources
Developing and Documenting Models for Successfully Connecting Schools to the Internet and Making Information Available for Educators Nationally

Three new school districts were added to the EduNets Program this quarter. We are currently working with twelve K-12 school districts in Northern New Mexico and have individual model and research sites in three additional districts. We have a waiting list and hope to be able to add three more districts during the second quarter. School districts in the program (* indicates those added this quarter) are:

Cuba Independent Schools
Pojoaque Valley Public Schools
Central Consolidated Schools
Gallup/McKinley County Schools
Zuni Public Schools
Española Municipal Schools
Santa Fe Public Schools
Pecos Independent Schools
St. Boneventure Mission Schools (Indian Mission)
* Peñasco Independent Schools
* Dulce Independent Schools
* Mesa Vista Consolidated Schools

We are working with five community colleges and university branches, two departments of education, and two technology centers to help them develop Internet support and training centers for local schools and their communities; the Jicarilla Apache Department of Education and the Santa Fe Technology Learning Center were added this quarter. These centers are already becoming valuable "Internet resource hubs" for their communities. Hub sites currently in the program (* indicates those added this quarter) are:

UNM-Gallup, Gallup, NM
Northern New Mexico Community College, Española, NM
Crownpoint Institute of Technology, Crownpoint, NM
Navajo Community College, Shiprock, NM
Navajo Community College, Tsaile, AZ
New Mexico State Department of Education, Santa Fe, NM
Cooperative Educational Services, Albuquerque, NM

* Jicarilla Community Education Center, Jicarilla Apache Dept. of Education, Dulce, NM
* Technology Learning Center, Santa Fe, NM

We have formed LANL EduNets Internet Education (IE) Teams at all sites in all twelve school districts, designed to include local IE training and technical support teams. We have an active and growing Northwestern New Mexico IE Regional Working Group with over 100 members from Gallup-McKinley County (Gallup, Crownpoint, Yatahey, Church Rock, Ramah, Navajo, Smith Lake, Thoreau, and Tohatchi); Central Consolidated (Shiprock, Newcomb, and Kirtland); and Zuni districts. North Central and Northeastern New Mexico IE Working Groups will be formed starting with the district and hub IE Teams in the region.

Happenings this Quarter

Science Education and Outreach has partnered with CIC-6 to connect teachers and students to Internet resources and to integrate the use of technology into the classroom. The partnership combines the technical expertise of CIC-6 with the educational experience of Science Education and Outreach to prepare the schools for the use of technology to enhance instruction. The program leverages the knowledge and skills of the Regional Educational Technology Assistance (RETA) cadre who form a regional support structure that will help districts in New Mexico establish the capacity to conduct and sustain high quality educational programs and connect technological resources for additional professional development.

Edunet visits to Alvord Elementary School and the district computer lab in Santa Fe took place in November and December of 1995. Edunet workshops are scheduled for Gallup and Shiprock school districts for late January and early February. The workshops will:

- provide vision and leadership for educators in planning how to integrate technology into the learning process;

- assist districts with development in educational technologies;

- help educators and administrators share information about best practices in classrooms and uses of technology in administration;

- guide districts in strategies to increase parent involvement and strengthen public awareness of uses of educational technologies;

- provide a framework for monitoring and assessing the implementation of local technology plans; and

- connect local educational technology needs with regional and state resources.

The Technology Learning Center was completed at the Sierra Vista Complex in Santa Fe. We assisted with setting up the Internet Lab and solving problems with their Internet connections. The Edunets team and LANL's support were highly recognized at the grand opening and dedication in October.

Peñasco, Dulce, and Mesa Vista school districts were added to the Edunets program. Initial site visits, analysis, and initial recommendations were made for all three districts.

We added the Jicarilla Community Education Center, Jicarilla Apache Department of Education (JADE) in Dulce, as a "training hub" site. We assisted them with their LAN and 56KB Internet connection configuration and provided troubleshooting support with their network connections. The Dulce Schools plan to connect through the JADE network. We will be doing workshops in the lab starting in January for the Dulce IE Teams.

The State Department of Education 56KB line is in, their Internet server is up, and their Web site has been established and tested! We are starting work on their homepage.

The T-1 line to the Navajo Community College (NCC) Shiprock campus was installed and a 56KB connection is up at NCC Tsaile! The Central Consolidated Schools Central Office in Shiprock, Shiprock High School, and Tse-Bit-Ai Middle School will tie into the NCC Shiprock campus connection.

A 56KB line was installed at Kirtland High School. We will help them set up the Technology Lab at Kirtland High in January. This will be a Windows '95 lab. The Central Consolidated Schools Central Office in Kirtland is expected to be the next to be connected.

St. Boneventure, Mesa Vista, Peñasco, Gallup-McKinley, and Española school districts are all planning new or more 56KB direct Internet connections. Lines have been ordered or are in the process of being ordered for several sites within these districts, so we anticipate more line installations next quarter.

NT servers were set up and tested at Northern New Mexico Community College, Cuba Schools, UNM-Gallup and NCC Shiprock. We are setting up an NT server in Dulce in early January and are highly recommending NT servers for many of our sites.

LANL donated four SUN 3/60 workstations (from surplus) that are being set up at four of our sites – Navajo Community College (NCC) Shiprock, UNM-Gallup, Crownpoint Institute of Technology (CIT), and Gallup-McKinley County Schools. The sites are providing their own hard drives and staff to maintain the workstations. We finally got the red tape completed and have started setting up the machines for use as servers for mail, UNIX training, or backup servers depending on the site needs.

We held a northwestern regional workshop and working group meeting at UNM-Gallup in October. IE Support Team representatives from Zuni, Central Consolidated, Gallup-McKinley County, CIT, UNM-Gallup, NCC Shiprock, and St. Boneventure schools and campuses attended. The next meeting and workshop is scheduled for January and workshops are being scheduled at UNM-G for February and March.

We offered two more hands-on Novell Workshops, beginning and advanced, for district technical support team members in December. The workshops are limited to ten participants in each and are arranged and held at CES in Albuquerque. Twenty technical support team members from Central Consolidated, Dulce, Gallup-McKinley, Cuba, and Pojoaque school districts technical support teams attended the December workshops.

Northern New Mexico Community College now has two Internet Labs operational! We have helped set up several servers and have set up an NT server for EduNets district IE teams e-mail, database, and training support. We completed basic Internet training workshops for the faculty, staff, and tech support teams at Northern and hope to start workshops for the North Central LANL IE Working Groups in the NNMCC labs starting in February. We will have a workshop for area school superintendents at Northern in January.

The first Internet lab at NCC Shiprock was completed and we will conduct workshops there January 9-10. More workshops are scheduled for NCC faculty and staff and LANL Northwestern IE Working Groups in January and February.

Team members attended the COMDEX Conference in November where they got information and sampled the latest and hottest networking equipment and software. The team gathered a lot of information and materials to use and share with our sites.

Positive Feedback

Letters commending the EduNets team efforts and LANL support were sent to LANL management from many of our school districts and hub sites this quarter. The EduNets team efforts and the value of LANL support were recognized at the grand opening and dedication of the Santa Fe Technology Learning Center in October. LANL staff, including the EduNets team, were recognized for our help and support at Northern New Mexico Community College (NNMCC) at a luncheon in December – we even made the Rio Grande SUN newspaper for the second time! Our efforts and support were recognized by the UNM-Gallup President at a luncheon on campus in December. Kurt Steinhaus, State Department of Education Technology Director, has cited our accomplishments in legislative meetings and has even proposed funding by the state to try to "clone" our team

because of our effectiveness. Perhaps the best feedback for us: the thanks, e-mail, and enthusiasm that we receive from administration, community members, teachers, staff, faculty and students at our sites have been extremely positive and rewarding.

Our Extended Team this Quarter

We were able to contract with CIC-4 for several hours of support time the past few months that has been very valuable to our efforts. Ron Nutter and Greg Hamilton helped troubleshoot line problems and provided valuable communications support and input at Crownpoint and UNM Gallup. We are very happy to have Robert Martinez, CIC-4, working with Peñasco and Alex Montaño, CIC-5, helping with Mesa Vista. Jerry Lopez's work with the Española schools and Randy Bailey's assistance with NNMCC through Rick Ulibarri's outreach program have been great.

The EduNets Program

We help our districts and regional center sites with network and infrastructure design; bid specifications, resources, contacts, recommendations, and contract reviews; LAN and WAN consulting; software design, selection and installation; and, testing and troubleshooting as needed. As a regional center site gets their lines in, we use the "Internet hubs" initially as training sites for the faculty and staff at that site and for school districts' faculty and staff in our LANL Internet Education Working Groups in that area.

One of our primary goals is to make the districts as self-sufficient as possible with regard to having local Internet training and networking support teams in place. We work with the district superintendents' offices and school sites to target teachers and staff to form these district teams. We provide approximately 16 hours of hands-on basic Internet training workshops (overview, Netscape, and other browsers, search engines, e-mail, FTP, and telnet) and optional advanced and topic specific Internet workshops for all members of the working groups and site Internet Education (IE) teams; then these local teams of teachers and staff are able to do or help with the workshops for all of the teachers, staff, and students at their sites as the schools get connected. We provide additional special technical support, networking workshops, and on-site training for the technical support teams (a subset of the district IE team). And, we are holding regional working group meetings with workshops for updates and information sharing. We do faculty and staff Internet training workshops at "Internet hub" sites as soon as the lines are in place and, if needed, provide the hubs with workshop materials and library reference sets. We have found that our community colleges and university sites are able to offer classes for students within weeks after getting their labs connected and configured.

While planning and negotiations are ongoing, and line installations are pending, we work with the superintendents' and hub offices to try to get temporary e-mail and Internet SLIP or PPP accounts, Internet workstations, and dial-up capability available for all working group members. Temporary account sources are primarily NM Technet, state library accounts, commercial access providers, and some of our sites that are already up-and-running. CIC Division has also provided a few temporary LANL accounts for special cases and needs. This way

the working group members can participate in the training workshops in advance and be prepared to help with the training and support for the rest of the faculty and staff in their districts when the installation of lines are complete and their own networks and labs are ready for them.

It is a "gentleman's agreement" that sites we help will try to help other sites as much as they can. And it is working out beautifully! Some of the ways they are helping include letting us use their labs and facilities for meetings and workshops, providing members of their IE support team to assist with workshops, providing lab access and/or providing e-mail accounts on their pop servers for other working group members and workshops, becoming beta test sites for our testing of equipment and software, and setting up dial-up access for their areas.

After preliminary site visits and analysis, we work with each district and hub as needed and requested to get their Internet connections installed and/or operational. We provide assistance with developing and/or implementing networking plans; getting bids for line installations; testing or troubleshooting installations; and/or all of the above, depending on the request, need, and status of development when we start working with the district or site.

When a school, district, or hub gets a line installed (usually 56KB at schools; 56KB or T-1 lines at hubs), we work with the local technical support team to get Internet servers established – e-mail pop and WWW servers. We have helped set up a variety of servers over the past year, depending on needs and equipment availability, from Sun and NT servers to PC and Mac servers. Most of the schools, districts, and hubs already had LANs in place and one of our tasks is to help them get everything working together with their Internet connections and customized to fit the site security, scope, needs, and plan.

Training workshops and on-site training are scheduled and supported for the Regional Working Groups and for the district and hub IE teams as the sites are developed. Gathering site and team member information and feedback is an ongoing process.

Distance Learning and Educational Technology

Activities during this quarter focused on finishing a commitment to the Instructional Technology Advisory Group (ITAG) of the Interservice/Industry Training and Education Conference, working with the American Council for Distance Education and Training in the preparation of a problem statement for a summer 1996 study, and exposing the rural educators of New Mexico to possibilities associated with the University On Line of Falls Church, VA. These items will be expanded below. Other activities included staying abreast of local progress toward creating a conference center in Los Alamos that has an integral distance learning component.

The commitment to the ITAG required planning for and supporting a special event at the annual conference this year, held in Albuquerque in mid-November. While the conference was well attended, it was materially affected by the Federal Government shutdown. The LANL contribution was principally facilitating a presentation by the NASA Classroom of the Future located at the Wheeling Jesuit College in Wheeling, WV. With this conference, all commitments have been

successfully met. However, the Army's Training and Doctrine Command has expressed interest in creating a special distance learning presentation at the next conference aimed at demonstrating the ability to teach cognitive motor skills at a distance and demonstration of George Papcun's work on virtual x-rays of the voice system (reported on elsewhere in this report). Discussions continue and could result in funding for these efforts.

The American Council for Distance Education and Training was an outgrowth of two Laboratory sponsored conferences on distance learning several years ago. The Council is the recognized U.S. affiliate of the International Council for Distance Education. In an effort to stimulate interest in the Council and provide a platform for growth, ACDET has undertaken to hold a working conference next August patterned after the Laboratory's previous example. ACDET is in the process of raising funding and, during this quarter, focused on development of the problem statement centered on creating learning communities. The text of the problem statement follows. (Note that all or part of the statement can be deleted.) This study might be appropriate for separate DOE support under their distance learning program as expressed on their World Wide Web page.

Systems Modeling for Education (Formerly Cyberpede)

Two workshops were conducted for teachers during this quarter. A two-day training in November helped teachers learn how to use the STELLA II simulation software and how to create appropriate classroom applications. The workshop was conducted by Corey Peck of High Performance Systems, the creators of the software. Several heat transfer models were developed by the teachers to help them prepare effective classroom activities using technology and to evaluate the effectiveness of educational technologies. The last workshop provided an opportunity for the development team to re-define short-term and long-term goals and objectives. The design criteria for the educational technology product was tightened and improved. Teachers refined the design and implementation of heat transfer simulation and modeling activities which will be used with students later in the semester. Requests for a Laboratory collaboration in designing a dynamic graphical user interface for the simulation section of the product continued. One interested team from CIC Division met with the coordinator recently and will respond with a collaborative proposal by the end of January.

GEONet/TOPS Electronic Bulletin Board

During the first quarter of FY ‘96, efforts on GEONet concentrated on the following.

- Upgrading the system so that system maintenance can be performed while the system is running.

- Training users on GEONet’s new features, such as the on-line maintenance, Internet mail, and telnet access.

- Working with SEO program coordinators to launch the ‘96 school year programs.

- Introducing and training LANL employees volunteering for SEO programs to GEONet.

FY ‘96 is the first year that GEONet has offered it’s users access to Internet mail and selected telnet sites. Hence, beginning with the first quarter, we require preapproved accounts and passwords to access the system. This increases our security, but also increases time required for system administration of the system. It also increased the amount of time the system was unavailable to users, since new accounts could previously be created only when the system was shut down.

For these reasons, we modified GEONet to allow specific people, such as program coordinators, to perform some system administration tasks, and we devoted significant time this quarter to training our new “superusers”. They can create user accounts, access accounts for information such as forgotten passwords and modify files such as program calendars, data templates and upload directories. More importantly, the maintenance can now be performed while the system is running, so that even though our administration time has increased with Internet access and more users, our down-time is minimal.

Training was the keyword for old users, new users, and an exciting addition to our GEONet community, LANL employees volunteering as electronic mentors for LANL Science Education Programs. Workshops were held to train TOPS teachers and those involved with the Critical Issues Forum. Site visits were made to the offices of numerous scientists and engineers to understand their network configuration and recommend the best way to connect to GEONet. We also updated the User’s Manual to include information on Internet access and increased the number of help files available on-line.

Communication and planning were the keywords for GEONet and the Science Education Outreach group. We are now conducting monthly meetings with SEO to ensure that GEONet is satisfying their needs as well as forming ideas for new collaborations involving GEONet and electronic communication.

Model-Nets: A National Study of Viable Models of Networking Technology in K-12 Education

During the first quarter of FY '96, work began on the production of an interactive multimedia CD-ROM guide for school districts to disseminate the findings of the Model-Nets study, and to help schools with network planning. A computer scientist in CIC-6 will assist in CD-ROM production and will create and update WWW pages for the program as required. Work is continuing on the Model-Nets final report and a networking guide to assist schools and districts in network planning will be written. Software and hardware is currently being acquired for CD-ROM production, and CD-ROM and WWW design. Focus groups were conducted with New Mexico teachers to help with CD-ROM design, and multimedia workshops at MIT and software training sessions in Phoenix were attended. Meetings are held on a regular basis to maintain product and report coordination.

PUBLIC UNDERSTANDING OF SCIENCE

Practical Applications for Young Scientists (PAYS)

Activity on the PAYS program in this quarter focused on two main areas: program planning and recruitment.

Program planning efforts focused on determining dates of participation for students, researching Laboratory-related science themes for student communications projects, and identifying Laboratory technical resources to assist with the delivery of the PAYS program. The academic-year portion of PAYS will run Wednesdays from 4:00-6:00 p.m. beginning February 7 and ending April 24; the summer session of PAYS will take place July 8 - August 2.

Recruiting began with an informational mailing (program overview and applications) and visit to the following schools: Santa Fe High School, Capitol High School, Santa Fe Indian School, St. Catherine's Indian School, Pojoaque High School, and Española Valley High School. A recruiting package was sent to Taos High School, Peñasco High School, and Jemez Valley High School. Applications are due January 19, 1996.

Science Education Information On-line

The World Wide Web (WWW) server for the Science and Math Education Program at Los Alamos has been quiet this quarter. Major activities have been primarily in the area of infrastructure. Working out problems with new hardware and software for the server has taken significant time.

A basic introduction workshop on HTML was prepared and presented to more than 900 participants in the NM Supercomputer Challenge kick-off meeting in October. Several other workshops on HTML were presented to the Science Outreach Program participants in RETA.

The Science at Home web information was awarded a four-star rating by The McKinley Group. This is the highest rating an Internet site can achieve in Magellan. Yet this project information has been removed from the server since the project is working to publish this information in other forms.

Work is still continuing in several areas. These include:

- Updates to the Program WWW pages to reflect FY96 changes.
- Assistance to projects to add their resources to the server.
- Continuing work for the upgrade to the server hardware and software.

From October 1 through December 31 over 2,900 different sites outside of Los Alamos and from more than 43 countries visited the server. These visitors transferred more than 33,000 files representing more than 253 million bytes of data. Detailed statistics on access to the server are kept and summaries are available for viewing on the server.

The top seven subject areas of interest on the server for this quarter are:

- Science at Home
- Science Education Program project information
- NM Online Internet Institute (OII)
- Science and Technology Base University Outreach
- Science and Technology Base UC Coordination
- Model-Nets Project information
- TEAM project information

The uniform resource locator (URL) for the WWW server is:

http://education.lanl.gov.

OTHER
K-12 Equipment for Education Program

The K-12 Equipment for Education Program was turned over to a new coordinator in October of 1995. During the fourth quarter, 98 items were gifted through four Science Education programs. The value of all items was $261,035.77.